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ABSTRACT

Virtually every aspect of modern life has been changed and shaped by the computer's tiny, ubiquitous silicon chips. It is not surprising that computers have had a profound effect on the way students learn in the modern classroom. This topical bibliography and commentary focuses on how computers can be used to enhance the teaching of language arts. It first discusses the features of common software programs, such as word processors and spell-checkers, and then moves into a discussion of how computers are used in the elementary classroom and in what ways they influence students' writing processes. Finally, the bibliography/commentary explores different types of technologies teachers use in the classroom and offers guidelines for their use. Lists 2 Internet resources and 12 references. (NKA)

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Topical Bibliography and Commentary

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Computers and Grammar, Usage, and Mechanics

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Introduction

What, in recent memory, has changed the world more than the advent of the computer age? Virtually every aspect of modern life has been shaped by the tiny, ubiquitous silicon chips. It is not surprising, therefore, that computers have a profound effect on the way students learn in the modern classroom. This summary will focus on how computers can be used to enhance the teaching of language arts. It will first discuss the features of common software programs, such as word processors and spell-checkers, and then move into a discussion of how computers are used in the elementary classroom and in what ways they influence students' writing processes. The summary then explores different types of technologies teachers use in the classroom, and offers guidelines for their use.

Computer Use and the Mechanics of Writing

In order to understand the value of computers in the teaching of language arts, it is first necessary to understand the goals of the language arts curriculum. Since the computer is a modern addition to the established tenets of the language arts curriculum, its use can be assessed only within that framework. Daiute (1985) states that "elementary language arts instruction is usually devoted to helping children understand language critically and express themselves in speech and writing" (p. 1).

Some children are especially challenged by efforts to express themselves in writing. According to MacArthur (1999), one reason for this may be that "problems with mechanics interfere with higher level composing processes and affect both the quantity and the overall quality of writing" (p. 2). The term "mechanics" in this instance refers to the processes involved in getting words into print—handwriting or typing, spelling, grammar, and formatting. Students who are so challenged by these mechanics as to be distracted from the actual act of composing may respond positively to using computers for their writing. There are several types of software programs that make the mechanics of writing less daunting for these students; the following list offers a brief discussion of some such programs.

- **Word Processing.** The most significant and perhaps most commonly used software for a language arts setting is word processing software. Word processing programs allow students to interact with text on their computer screens. According to Nichols (1996), word processing programs are coming to be as fundamental to the elementary classroom writing experience as pencils and paper. There are several features of word processing software that may influence students' writing process. The first is that it is much easier to edit and revise work when using a word processor than when using pencil and paper. Rather than having to erase and/or rewrite, students can make small changes—or even large ones—with just a few keystrokes. A second significant characteristic of word processors is their ability to print out work. "The motivation provided by printed published work may be especially important for students who struggle with handwriting and mechanics" (MacArthur, 1996, p. 3). Finally, the physical act of typing may be easier for some students, especially those who struggle with handwriting.

  Several studies have been conducted on how word processing impacts elementary students' writing performance. Results of these studies are mixed, with some indicating that word processing software has a slight beneficial effect, other indicating that the influence is negligible, and still others indicating that improvements depend more on teaching strategies *in combination with* word processing. Despite the lack of clear-cut findings, Nichols (1996) notes "many educators contend that the use of word processing for composition will most likely increase the quantity and quality of the writing produced" (p. 1).
- **Spelling and Grammar Checking Programs.** Most current word processing programs contain integrated spell-checks, and many such programs also contain grammar checks. These features can generally be toggled on or off, depending upon the user preference. Spell checkers flag misspelled words as the student types them, and—in some cases—suggest correct spellings. According to MacArthur (1999), spell checkers are useful to most writers to some degree. However, "they seem to be most important for students who have the greatest difficulty spelling. For these students, spelling checkers might not only improve spelling, but may also enhance motivation and encourage students to use a wider vocabulary" (MacArthur, 1999, p. 4). Spell-checkers have their drawbacks,

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however; they cannot identify pronouns, modifier errors, or words that are wrong simply because they do not fit the context (*to* instead of *too* or *there* instead of *their*, for example) (Haist, 2000).They also tend to flag many proper nouns and place names as misspellings, which can be confusing to students. Therefore, when using a spell-checking program, it is important for students to be aware of these limitations.

Grammar checking programs function much the same as spell-checkers, except that they flag incorrect syntax, punctuation, sentence structure, and capitalization. MacArthur asserts that these programs appear to be of limited usefulness to elementary-grade students because they frequently fail to pick up serious grammatical and mechanical errors.

- **Voice-Recognition Software.** Voice-recognition software allows students to dictate their "writings" orally. The software program translates their spoken word into text. This type of software can be helpful for students who have trouble with basic writing skills because it completely eliminates the need to focus on the mechanics of writing. A 1997 study by Raskind and Higgins found that learning-disabled students between the ages of 9 and 18 experienced significant improvements in word recognition, spelling, and reading comprehension when they used voice-recognition software to write.

  A drawback to voice-recognition software, however, is that their accuracy is never perfect. The level of accuracy depends upon the quality of the software, the consistency of the user's speech, the size of the user's vocabulary, and the amount of time spent training the software to recognize the user's voice.
- **Speech Synthesis.** The reverse of voice-recognition software, speech synthesis programs translate written text into spoken word. A student using a speech synthesis program would be able to compose his or her work on the computer and then hear it read back aloud. This may allow them to identify problems in their text such as incomplete sentences, misspelled words, or awkward phrasing.

Computer Use in the Elementary Language Curriculum

Daiute (1985) raises the issue that using the computer as a simple tutor may not address the needs of all students. "Often, students with the weakest skills use the computer only for drills, while more 'gifted' students are allowed to use the computer word processing programs for composing" (p. 1). Rather than having the computer separate the gifted students from those who are a bit slower, she feels that the computer should allow all students to be given a chance to use the computer "as a communication machine" (p. 1). Thus the computer may be seen as a sort of leveling force that allows all students to interact with the learning materials regardless of individual ability.

Daiute provides several guidelines for how teachers should practice their profession in the classroom. Foremost, the teacher must consider the number of machines available. If there are only a few machines, teachers and students must share the cluster, using it as a messaging center. Daiute mentions that producing a class newspaper is a popular activity. If there are "4 or more" computers available, then individual use becomes a realistic option (1985, p. 2).

There is a danger, however, associated with allowing students to work individually, especially on home computers. "Many teachers," she writes, "are concerned about the fairness of accepting homework on computer printouts from some children when others in the class do not have access to such sophisticated tools" (1985, p. 2). Clearly this is a situation that individual instructors must consider carefully.

Do Young Children Have Difficulty Using Computers?

Daiute (1985) asserts that "many children have an easier time learning to use computers than adults do" (p. 3). Young children are more apt to remember key commands, and if commands are introduced gradually, they can easily learn how to use a complicated word-processing program. This process, however, does not occur overnight.

> Children in the upper grades who have been successfully using pencils or pens take at least a term to begin to write as much with the computer as they can with pen in the same time. Typing and frequent access to the computer as a writing tool can speed up this process. Even before attaining such fluency, however, students using computers seem to be much more willing to stick to or return to writing tasks. (Daiute, 1985, p. 3)

Children, therefore, when given adequate time to learn computing skills, are quick learners. Furthermore, they often see more immediate results when composing on the computer and therefore are more inclined to write with greater frequency.

How Does the Use of Computers Affect Students' Writing?

Although researchers have not agreed about whether the quality of students' writing would be improved by using computers, the computer does improve student writing at a more specific level (Moeller, 2002). There are two main areas in which computers seem to make a significant difference in the way students write. The first is length of composition. According to Nichols (1996), students using word processors write compositions with more sentences and more words than students using pencil and paper. In the author's study, children who used the pencil-and-paper method wrote an average of 13.55 sentences per composition, while children using word processors averaged 21.50 sentences. The number of words per composition was also significantly greater for students using word processors (pp. 4-5).

A second way computers impact students' writing is in the area of revision. Lehr (1995) reports that students using word processing to write compositions tend to work longer at their compositions and to make more edits and revisions to their text. "Data indicated that students continuously revised and edited their work at all stages of the writing process, with most of the revision done in the initial drafting session, making the traditional distinction between draft and final versions of a piece less meaningful" (p. 3).

What Technologies Do Students Actually Use?

Higgins describes the physical details of the technology that students use in the classroom. He focuses on a type of drill-and-practice programs referred to as computer-assisted language learning (CALL) programs. This software concentrates on "vocabulary and specific grammar points" (1993, p. 1). Another type of program, however, was on the rise with increasing frequency when Higgins wrote his article. These "simulation programs", while still focusing on grammar, present students "with real-life situations in which they learn about the culture of a country and the protocol for various situations". The goal of this software is to "provide an entertaining environment for students to learn culture and the target language through problem solving and competition" (p1).

CALL programs provide the greatest flexibility for teachers, since these programs allow teachers to integrate their own material with the software. "In this way," Higgins states, "teachers are able to design the program to fit their own lesson plans" (Garrett, 1991; Willetts, 1992; cited in Higgins, 1993, p.1).

The physical topology of the student computing environment plays a major role in determining the shape of the education that takes place. Computers linked together in networks are changing the way teachers approach teaching. Local Area Networks (LANs), as Higgins defines them, are "computers linked together by cables in a classroom, lab, or building" (p. 2). LANs allow students and teachers, for example, to engage in cooperative writing or group editing exercises. Group editing software gives students individual access to a document, while allowing the teacher to monitor each student's contributions. The teacher is able to restrict students' access to "read only," "make changes," or "make comments" in order to control the project and give each student a turn to take different roles in the project's development. Each student's changes are highlighted in a different color. By using technology in this manner, teachers can observe and monitor the activities of their students, sending messages to each individually.

Advances in compact disk technology have made it possible to pack detailed educational simulations in a small space. The single greatest benefit to students of a foreign language is the compact disk--read only memory (CD-ROM)'s ability to store digital audio files of superior quality.

> With such programs, students are able to hear the pronunciation of a phrase, a word, or even a syllable or sound and then record their own voice following the example. The students can then listen to the original recording, as well as their own, and compare the two. They can record their own voices again and compare the two until they feel their pronunciation had improved or is correct. (Higgins, 1993, p.2)

Principles for Using Interactive Software in the Classroom

Although the benefits of computer technology may, at first glance, seem to bring a host of improvements to the classroom, dangers exist. Sullivan (1993) lists ten guidelines intended to provide the foundation of a solid method for using computers in the classroom.

1. *Use only the simplest software.* Use a program that provides the functionality that the task requires, and no more. In contrast to popular opinion, she advises the teacher to avoid programs containing style checkers and grammar checkers, as "they are cumbersome and interfere with the writing process". She is, however, in favor of CALL programs because they are interactive and provide students with the correct answers.
2. *Insist on adequate technological support.* In order to maximize the amount of time students spend on productive activities, a technical staff that knows how to operate the machines should be available. Barring this, the teacher should acquaint himself with the basic operation of the machine.
3. *Do not suppose that because a program is simple for you, it will be for your students.* Sullivan provides an example that shows in general although the quality of the students' works-cited page was higher, several students failed to turn one in at all due to their frustration with the program.
4. *Remember that with technology, sometimes less is more.* Like Higgins, Sullivan recommends introducing technology gradually. Introduce only features that students need to perform a particular task, and no more.
5. *Do not have inflated goals for student computer use.* For many students, simply using a computer is victory enough; not every student is going to write a novel in class.
6. *Do not be afraid to use the whole class period to introduce technology.* Sullivan suggests a letter of complaint and then reply as a good beginning project.
7. *Do not fear that with interactive exercises and e-mail, your class will become just another bull session.* "Interaction among students should be encouraged," Sullivan writes, as it can take advantage of peer pressure to cause students to perform well. Peer review is an especially effective method spurring greater performance out of students.
8. *Use the computer as a way of increasing rather than diminishing demands on students.* Due to the public nature of internal class e-mail, the computer "increases the publicity for student errors, and therefore can encourage increased insistence on correct writing". The computer, then, does not make class easier for students, but facilitates an environment of learning.

9. *Be flexible with your students in the lab setting.* The computer encourages self-paced learning. Students who finish assigned tasks early should be provided with tasks to keep them busy. Slower learners should be made aware of the teacher's minimum demands.
10. *Beware the Goddess Technology as DESTROYER!* Unskilled computer users may, with a single keystroke, lose hours of work through incorrect operation of the computer. Sullivan states that it is vital students not blame the teacher or the lab technicians for a lost or destroyed paper. Guideline number 2 is the obvious corollary here; a well-informed teacher should impart knowledge of proper file maintenance procedures to her or his students, (adapted from Sullivan, 1993, pp. 1-3)

New Writing Opportunities Provided by Computers

The increasing availability of computers both in the classroom and in many students' home environments offers teachers and students new and exciting writing opportunities. For example, students can use e-mail to practice their written communication—without even being aware that they are writing. According to McKay (1998), "e-mail will make prolific writers out of students who would rather die than create a paragraph for an assignment" (p. 2). Another new type of writing is writing for the Web—that is, writing for hypertext. Asking students to create a hypertext-like document can be an interesting exercise in finding connections and relationships between topics.

Conclusion

The use of computers in the classroom will continue to change the way teachers and students interact with learning materials. It is vital that the machine itself does not become the object of study but rather a vehicle enabling students to interact with the subject at hand. The computer is simply a machine, a tool. Although it presents new possibilities, it also presents danger if misused. Because the computer provides the opportunity for independent learning, students may become sidetracked without direct supervision. It is vital that the instructor prevents her or his class from becoming a "bull-session" and keeps firm reins on computer activities in the classroom.

Internet Resources

* Word Processing and its Effect on the Writing Process
This article examines the effect of word processing on the writing of third through sixth graders.
An article from TechLEARNING.com
http://www.techlearning.com/db_area/archives/WCE/archives/herrick.htm
* The Effects of Using Word Processors: A Hard Look at the Research
By William J. Hunter, Gail Jardine, Peter Rilstone, and Roslyn Weisgerber, The Writing Notebook 8(1), 42-46.
This article looks at the research that examined the use of word processors in the teaching of writing.
http://www.ucalgary.ca/~hunter/writ.html

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